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EASTERN WHITE PINE

Eastern white pine has been in great demand in America for more than three centuries. Until 1895 it lead all species in lumber production. White pine is light in weight and easily worked with tools. It resists splitting, holds paint well, and holds nails fairly well. Wood from original stands made superior pattern stock, millwork, and trim lumber. Most of today's timber is cut for lumber; the remainder is converted chiefly to pulpwood. Better forest management could increase production of white pine and improve the quality of lumber cut from young-growth stands.

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EXPERIMENT STATION

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Figure 1.—Range of eastern white pine.

F-520673

COVER—Typical forest-grown eastern white pine tree about 100 years old.

EASTERN WHITE PINE

(Pinus strobus L.)

Myron D. Ostrander [1]

DISTRIBUTION

The natural range of eastern white pine extends from Newfoundland west to southeastern Manitoba, southward through the upper Lake States to Pennsylvania, New York, and New England. It also extends southward through the Appalachian Mountain range to northern Georgia (fig. 1). It grows well outside its natural range. It has long been planted in northern Europe, and one variety grows in Southern Mexico and in Guatemala.

Distribution of eastern white pine over its range coincides reasonably well with that part of eastern North America where the July temperature averages between 62 and 72 degrees F. It attains its best growth in cool, humid locations of the southern Appalachian Mountains.

Although the present volume of white pine timber is but a small fraction of the original stand, probably the total acreage occupied by various white pine types exceeds that of the original stands. The total number of stems of white pine today probably exceeds the original count. In New England particularly, the acreage of nearly pure white pine stands now growing on previously cultivated and pastured land is an appreciable share of the total white pine acreage.

At one time white pine was the most widely planted American tree. Today it makes up only about 10 percent of forest plantings within its natural range. Although sparingly used for street or roadside planting, eastern white pine is favored as an ornamental tree for lawns and parks.

DESCRIPTION AND GROWTH

White pine is the fastest growing northeastern forest tree even though growth is relatively slow for the first 10 years. Under favorable conditions it reaches heights of 100 feet or more and diameters of 3 to 6 feet. Under present economic conditions, however, trees usually are cut at 60 to 80 years of age. They measure 12 to 18 inches d.b.h. and 80 to 100 feet high.

The sturdy, gradually tapering trunk and the horizontal limbs are characteristic features of white pine in the northern forest (see cover). Eastern white pine grows the tallest of any pine in the eastern United States, but in the West sugar pine and exceptional trees of a few other western species surpass it. Specimens growing in understocked stands or in the open develop a different form and have wide bushy crowns.

Eastern white pine is distinguished from all other eastern pines (red, jack, pitch, and southern pines) by its bluish-green needles in bundles of five, 3 to 5 inches long, that remain on the tree from 3 to 5 years (fig. 2). The cylindrical cones, 4 to 8 inches long, have thin, usually gummy, scales containing small winged seeds that are liberated at the end of the second season's growth. The name *strobus,* from the Latin word for "pine cone," probably refers to the conspicuous cone.

The bark of young trees and branches is thin, smooth, and greenish-brown. With increasing age, the bark darkens and becomes thicker and deeply furrowed, sometimes reaching a thickness of 3 inches (fig. 3).

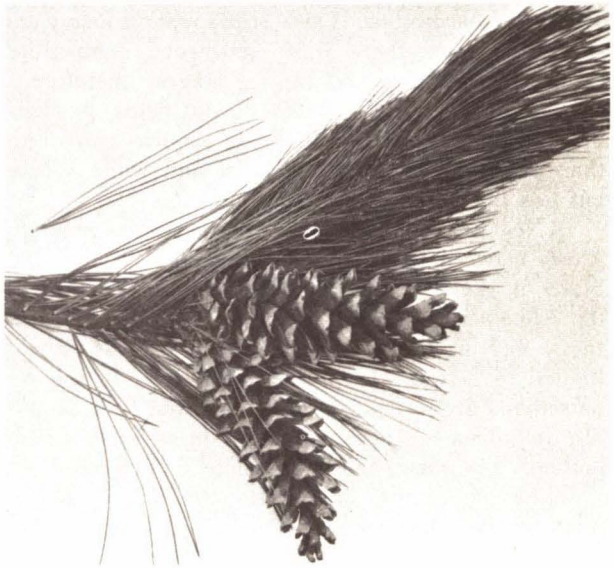

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Figure 2.—Needles and cones of eastern white pine.

[1] Research forester, Northeastern Forest Experiment Station, USDA Forest Service.

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Figure 3.—The deeply furrowed bark of a mature eastern white pine.

This species grows on practically all soils within its range, but best on well drained sandy soils that permit satisfactory growth of white pine but not of the more aggressive hardwoods. It also grows well on loamy and silty soils when there is no hardwood competition during the seedling and sapling stages; therefore it often establishes itself quickly on old fields, pastures, blowdowns, and burns. Seedlings require more light than eastern hemlock, balsam fir, and white spruce, but less than red pine or jack pine.

In New England and New York the species generally grows between sea level and 1,500 feet. In the Lake States it grows at all elevations. Southward through the Appalachians, white pine grows at higher elevations, and in the southern mountains it is usually limited to between 1,200 and 3,500 feet. In the Appalachians from Pennsylvania southward, it is usually found on northern aspects or in coves or stream bottoms. Elsewhere, aspect and slope do not restrict it.

White pine grows in nearly pure stands and in mixture with hardwoods as well as with hemlock and red pine and other minor softwoods. It is the major component of four forest cover types and is a minor component in 14 other hardwood and softwood types, including associations with northern hardwoods, paper birch, gray birch, spruce, fir, and northern white cedar.

The root system varies somewhat according to soil characteristics. Usually a poorly developed taproot with three to five lateral roots extending outward and down into the soil gives the tree a firm anchor. In deep, coarse-textured soils, sinker roots extend straight down from the main laterals.

Principal enemies of white pine are fire, white pine blister rust, and white pine weevil. The Pales weevil often attacks seedlings where timber has recently been cut. Because of its susceptibility to weevil and blister rust and because of the decline in demand for white pine lumber, forest planting of this species has declined. Blister rust can be controlled by eradicating the alternate plant host (gooseberry and currant) growing nearby, but absolute eradication may be difficult and prohibitively expensive. To date, control of the white pine weevil is limited to spraying the tips of trees. This weevil does not kill trees but frequently deforms them and renders them nearly worthless for lumber.

COMMON NAMES

Throughout most of its natural range this species is called simply "white pine." However, to distinguish it from its western kin, the prefix "eastern" is commonly used. Other common names are northern white pine, northern pine, soft pine, and spruce pine. European foresters have named it Weymouth pine for Lord Weymouth, who brought specimens from America to plant on his estate in England more than 250 years ago.

In commerce, the lumber is usually called northern white pine.

RELATED SPECIES

Other species of the white pine group (five-needled pines) grow in the Western United States. Two—western white pine (*Pinus monticola*), and sugar pine (*Pinus lambertiana*)—are commercially important and compete for many of the same uses as eastern white pine. Limber pine (*Pinus flexilis*) and white bark pine *(Pinus albicaulis)* generally do not reach commercial size, but small quantities reach local markets in a mixture with commercial species.

Other pine species are occasionally marketed with eastern white pine in the East, even though the character of their lumber is somewhat different. Red pine and jack pine lumber are often included in reported volumes of eastern white pine cut in the Lake States and New England. In recent years this practice has made it difficult to distinguish the actual volumes of each species. For certain uses the species

can be mixed, but each has certain characteristics that either restrict it or make it superior to the others for specific uses.

SUPPLY

The original stand of eastern white pine in the United States and in Canada was estimated at 750 billion board feet—more than the current estimated volume of *all* sawtimber in the United States east of the Rockies. Heavy cutting in the Lake States late in the nineteenth century greatly reduced the volume, and by 1938 the Forest Service estimated the stand of eastern white pine in the United States at slightly more than 18 billion board feet, of which only 6 billion board feet remained in the Lake States. Estimates in 1945 showed a volume of less than 15 billion board feet.

Since World War II, Forest Service estimates published in the *Timber Resource Review* (1953) and *Timber Trends in the United States* (1965) have indicated increasing stand volumes. Part of this increase resulted from combining the volumes for eastern white pine and red pine into one figure. The combined volume reported by the Forest Service in *Timber Trends* was concentrated in Maine, New Hampshire, Minnesota, New York, Michigan, and Wisconsin. Maine and New Hampshire alone accounted for 7,882 million board feet, or 37.1 percent of the total 21,255 million board feet. The other four States accounted for an additional 9,052 million board feet, or 42.6 percent. Probably not more than 3 billion board feet of red pine was included in the grand total; so the total sawtimber resource volume of eastern white pine in the United States was about 18 billion board feet. A slightly higher volume was estimated for eastern Canada.

PRODUCTION

Production of white pine lumber dates from early colonization of the Eastern States—possibly as early as 1630 in New York. Production centered in the Northeast for the next 200 years. Annual output reached about 1 billion board feet by 1840, when the old growth of the Northeast was nearly exhausted, and the logging industry moved west to the Lake States.

During the next 50 years, production of eastern white pine lumber increased tremendously, hitting an all-time peak of about 9.4 billion board feet in 1889; thereafter it declined to only 1 billion by 1920. Eighty percent of this production came from the Lake States, which continued to lead in production until 1930, when New England again became the chief producer of white pine lumber.

Production has fluctuated from a low of 198 million board feet in 1932 to a high of 1,244 million board feet in 1944. Annual production averaged about 1 billion board feet from 1941 through 1954, but since then it has again been decreasing gradually. Production in 1968 was estimated to be 715 million board feet.[2] All these figures include varying amounts of red (or Jack) pine, but forest survey statistics indicate that the volume of red pine sawtimber cut in recent years made up only about 30 million board feet—about 5 percent of the total volume. Current annual Canadian production of eastern white pine lumber is estimated to be about 320 million board feet.

Although the great bulk of white pine timber is converted into lumber, increasing amounts of low-grade material, generally from smaller or defective trees and tops, are being converted into pulpwood. In 1964, this amounted to about 190,000 cords. Lesser amounts of white pine timber are also converted directly into shingles and cooperage but total volume for these products has decreased over the years and does not now exceed 5 million board feet annually.

PROPERTIES

The heartwood of eastern white pine is light brown or reddish-brown and turns darker on exposure. The sapwood—narrow to medium in width depending upon the age and vigor of the tree—is white to pale yellowish-white. The wood has a slightly resinous but noncharacteristic odor and taste, is usually straight and even-grained, and has a medium texture. Distinct annual growth rings are delineated by a comparatively narrow band of darker summerwood. The springwood zone is generally wide, and the transition from spring to summerwood is gradual. Both transverse and longitudinal resin ducts are present; those in the longitudinal section appear as prominent brown streaks on both the radial and tangential surface of the wood. They are less conspicuous than those in the western white pines.

Eastern white pine wood is light in weight. Its ovendry specific gravity is approximately 0.37, and in an air-dry condition (15 percent moisture content) the wood weighs about 25 pounds per cubic foot. It is moderately soft and moderately weak in bending; its low resistance to shock limits its use as a structural species. It is average in nail-holding ability, shrinks very little, works easily with tools, takes glue well, and holds paint very well. The wood seasons easily, and the heartwood is intermediate in resistance to decay.

Eastern white pine has good pulp- and paper-making properties, and it is particularly suitable for the sulfate pulping process and for the manufacture of

[2] "Lumber Production and Millstocks," Current Industrial Reports—1968. Bureau of The Census. Series MA-24T-68-1.

high-grade kraft papers and board. The presence of pitch creates difficulties when white pine is pulped by mechanical means. The heartwood is difficult to pulp by the sulfite process. The wood is long-fibered, and pulp yields are about the same as for the spruces.

PRINCIPAL USES

Because of its many outstanding qualities, eastern white pine has been put to a greater number of uses than any other softwood species. Although the supply and quality of the species have greatly diminished, Forest Service statistics for 1965 indicated that eastern white pine lumber was used in 72 of 80 selected manufacturing industries and ranked ninth in total use of all species and fifth in the softwood group. Approximately 90 percent of the timber cut is converted into lumber. The bulk of the remainder is cut for pulpwood; and small amounts find their way directly into such products as wooden tubs, pails, and shingles without being first sawed into lumber.

During the peak years of production (1870 to 1900), white pine was the leading lumber species used in house construction, and many homes were built almost entirely from it. However, after 1900 it was superseded by southern pine and Douglas-fir; its use in building construction is now generally limited to millwork, paneling, and trim lumber. Construction now accounts for about 50 percent of the current use of eastern white pine lumber. Always favored for box construction, the bulk of the lumber production went into this use in the first half of the century. Even this use has declined from a reported high of 1,120 million board feet in 1912 to 123 million board feet in 1965.

One increasing use of eastern white pine as reported in *Wood Used in Manufacturing Industries* (1965) is for pallets. About 61 million board feet was used for pallets in 1965 as contrasted to 12 million in 1948. However, this increase was shared by all species used for pallets. Use of white pine in furniture has continued in moderate amounts: a reported volume of about 25 million board feet was used for furniture in 1969. Pattern-makers have always preferred clear, soft old-growth eastern white pine for pattern stock, and this species led in this use until supplies of high quality material were depleted. Sugar pine now dominates the market for pattern stock.

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